# IMPLICATIONS OF RISING PERSONAL RETIREMENT SAVING

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## ABSTRACT

Retirement saving accounts, particularly employer-provided 401(k) plans, have expanded rapidly in the last decade. More than forty percent of workers are currently eligible for these plans, and over seventy percent of eligibles participate in these plans. The substantial and ongoing accumulation of assets in these plans has the potential to significantly alter the financial preparations for retirement by future retirees. This paper uses data on current age-specific patterns of 401(k) participation, in conjunction with Social Security earnings records that provide detailed information on age-earnings profiles over the lifetime, to project the 401(k) balances of future retirees. The results, which are illustrated by reference to individuals who were 27 and 37 in 1996, demonstrate the growing importance of 401(k) saving. The projected mean 401(k) balance at retirement for a current 37 year old is $91,600, assuming that the 401(k) plan assets are invested half in stocks and half in bonds. For a current 27 year old, the projected balance is $125,500. These results support the growing importance of personal saving through retirement saving accounts in contributing to financial well-being in old age.

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The Individual Retirement Account and the 401(k) programs were introduced in 1982 to encourage personal saving for retirement.[1] Contributions to Individual Retirement Accounts grew rapidly until 1986, when $38 billion was contributed to these accounts. The Tax Reform Act of 1986 curtailed this program and by 1990 contributions had fallen to only $10 billion. They were only $8 billion in 1994. On the other hand, the 401(k) program has grown unimpeded since 1982. Now contributions to the 401(k) plan alone are greater than contributions to traditional employer-provided defined benefit and defined contribution plans combined. In 1993, 401(k) plan contributions exceeded $69 billion. Approximately 45% to 50% of employees were eligible for 401(k) plans in that year and over 70% of those who were eligible to contribute did in fact make contributions.

The increase in personal retirement saving can have important implications for the accumulation of retirement saving for future generations of retirees. Now, a large fraction of families approach retirement with virtually no personal financial asset saving. The median of personal financial assets of Health and Retirement Survey (HRS) families -- whose heads were age 51 to 61 in 1992 -- was approximately $7,000. This includes all financial assets held outside IRAs, 401(k)s, and related retirement saving accounts. Perhaps half of all families rely almost exclusively on Social Security benefits for support in retirement. The spread of 401(k) plans in particular could change this picture substantially. In this paper we simulate the 401(k) assets of future generations

of retirees and compare these assets with the Social Security and other assets of the households who are approaching retirement now.


## I.   OVERVIEW OF METHOD

Our goal is to project 401(k) assets of households who will retire 35 or 40 years from now. We direct attention in particular to the cohort that was age 33 in 1993, and will be 65 in 2025. We compare the projected 401(k) assets of this cohort to the assets of the HRS respondents. We first trace backwards to obtain approximate lifetime earnings histories of the HRS respondents. Lifetime earnings are grouped into ten deciles, assuming that over their careers household earnings were in the same decile. Contributions to 401(k) plans are projected for each lifetime earnings decile. Thus, we are able to ask what level of 401(k) assets such families would have accumulated, in 1992 dollars, had they had the same earnings histories as the HRS respondents but different amounts of contributions to 401(k) plans. We base the projections on the past growth in 401(k) participation rates and on the fraction of earnings contributed to the plans. The growth in participation since their inception, however, has been enormous and simple projections -- based on recent increases in participation -- are not very meaningful. Therefore, we make what we believe to be plausible inferences about future participation. We actually make three projections. The first projection is for the cohort that was age 25 in 1993. The second is for a younger cohort with higher assumed participation rates. For comparison, the third projection is under the assumption of universal adoption of 401(k) plans.

In the next section we document the growth of 401(k) plans and consider evidence on the amount of contributions as a percent of earnings. We then describe the foundation for our

projections and the method that is used. Finally, we discuss the projections and compare the results with the assets of the current HRS respondents.


## II.     THE 401(k) DATA AND ESTIMATION

### A.     The Growth of 401(k) Plans

We first document the growth in 401(k) contributions since their inception in 1982. Evidence on employee contributions and employer matching rates is presented in the next section. There are two principle data sources for 401(k) eligibility and participation rates. The first is the Survey of Income and Program Participation (SIPP). From the six panels of this survey data can be obtained for 1984, 1987, 1991, and 1993. The second is the Employee Benefits Supplement to the Current Population Survey (CPS). Data for this survey are available for 1988 and 1993. The participation rates assumed in the simulation analysis rely most heavily on the CPS data, but in discussing the growth in participation we first present data based on the SIPP.

The unit of observation in both the SIPP and the CPS is an individual. We have grouped the individual responses to form families. Unmarried persons are treated as single-person families and spouses are matched to recreate two-person family units. A family is eligible for (or participates in) a 401(k) plan if at least one member of the family is eligible (or participates) in a plan. Since 401(k)s are employer sponsored saving programs, we restrict the sample to families with at least one member employed. Further discussion of these surveys and the sample definitions are contained in a data appendix..

The first panel of Table 1 shows eligibility rates, participation given eligibility, and participation rates by age interval for four years, based on the SIPP data. In 1984, according to these data, 12.6% of employees were eligible to contribute to a 401(k) plan; they worked for employers

who offered a 401(k) plan. By 1993, over 42% were eligible. Eligibility rates are greatest for households with heads 40 to 44; rates are somewhat lower for younger as well as older households. The rates of participation given eligibility increased from 57% in 1984 to 70% in 1991, as shown in the middle panel of Table 1. But, according to these data, the conditional participation rate declined to 64% in 1993. (The CPS data, discussed below, show a substantial increase in conditional participation from 62% in 1988 to 72% in 1993, and we are inclined to doubt the apparent decline based on the SIPP data.) In 1984 and 1987 there was a noticeable increase in conditional participation rates with age, until age 55 or so. By 1991 and 1993, however, the correspondence between age and conditional participation was not very pronounced. Finally, unconditional participation rates, shown in the last panel of Table 1, increased from about 7% in 1984 to 27% in 1993.

Eligibility and participation rates are shown by income decile in Table 2. Earnings deciles are calculated separately for each year and thus the data are comparable from one year to another. Although eligibility is only moderately related to age, there is a consistent increase in eligibility with earnings decile. For example, in 1993, about 17% of households in the lowest decile and almost 60% of those in the highest decile were eligible. Conditional participation given eligibility also increases with earnings, although the relationship is not as pronounced as for eligibility. For example, in 1993, 44% of household in the lowest decile who were eligible also contributed; in the top decile 77% contributed. Combining eligibility and participation given eligibility yields a substantial relationship between participation and earnings, as shown in the last panel of Table 2.

Eligibility and participation are shown by both earnings decile and age interval in Appendix Table 1 for 1993. These data show little interaction between eligibility and participation rates by

earnings decile and age. Thus the simpler tables for age and earnings separately provide a good summary of the more detailed data.

Table 3 shows eligibility and participation rates by age interval based on the CPS data. These data show eligibility rates somewhat larger than the SIPP numbers. According to the CPS data, eligibility increased from 40% in 1988 to 50% in 1993. These data also show a substantial increase in participation given eligibility, from 62% in 1988 to 71% in 1993. Furthermore, the increase is apparent for all age groups. A comparable increase in conditional participation rates is shown in Table 4 by earnings decile. These data show an increase in all but the lowest earnings decile. This is an important result, which suggests an increase in individual retirement saving propensity. It is consistent with the recent findings of Bernheim and Garrett [1996], Bayer, Bernheim, and Scholz [1996], and Clark and Schieber [1996] who conclude that employer education programs increase saving. It would of course also be consistent with a more general increase in saving propensity over time, although we know of no evidence of such a trend independent from personal retirement saving.

Like the SIPP data, the CPS data show a substantial increase in eligibility with earnings, and a noticeable increase in conditional participation with earnings. Thus unconditional participation also increases with earnings decile. Appendix Table 2 presents eligibility and participation rates by earnings and age interval jointly for 1993. This table is comparable to the presentation in Appendix Table 1 based on SIPP data. As with the SIPP data, there appears to be no substantial interaction between age and eligibility or participation rates by earnings decile. Thus the simple text tables provide a reasonable summary of the relationship between age and earnings on the one hand and eligibility and participation rates on the other.

For convenience, the SIPP and CPS eligibility and participation rates for 1993 are compared in Table 5. Both eligibility and conditional participation rates reported in the CPS are somewhat larger than those reported in the SIPP. The SIPP overall average is 27% and the CPS average is 33%. Differences in the wording and ordering of the eligibility and participation questions in the two surveys may account for differences in the results. The survey differences are discussed further in the appendix.

We will compare our simulation results with the assets of the 1992 HRS respondents. The HRS also obtained data on 401(k) participation, but not eligibility, and on 401(k) balances. Because of the way the relevant questions are asked, however, the data on participation may be the least reliable of the three data sources. This issue is discussed further in the appendix. Nonetheless, for the age groups covered by the HRS, the participation rates calculated from the HRS 1992 responses are close to those reported for 1993 in the SIPP, as shown in Table 6. The HRS rates are also not very different on average form the CPS responses. For households with heads aged 51 to 61 in 1992, the HRS overall participation rate is 26%, which is the same as the SIPP rate for 1993. The CPS participation rate for 1993 is 33%.

## B.    Contribution and Matching Rates.

Participating employees make tax-deductible contributions to 401(k) accounts. Many employers also make matching contributions. The only survey that provides both employee contribution rates and employer matching rates is the 1993 CPS. Because of nonresponses, however, several assumptions must be made to infer employer matching rates for all employees. Basically we use the available responses for a given age to impute missing match rates for that age. Further details on these imputations are contained in the appendix.

Employee contribution and employer matching rates are reported in Table 7. These are earnings weighted family rates, averaged over rates for both members of a two-person family, for example. Based on these estimates, the average family contribution rate of plan participants is 6% of family earnings. The average contribution rate of an individual employee is 7.1%. The rate increases only mildly with age and shows little relationship to earnings decile. The employer matching rate is 2.7% overall, and bears little relationship to either age or earnings decile. Based on individuals (rather than families), the employer matching rate is 3.1% overall and 4.6% among employees that match. Thus the average total family contribution - counting both employee and employer contributions - is 8.7%.

Combining the total contribution rates with employee earnings, we obtain dollar contributions, which are reported in Table 8. Overall, the average combined contribution of plan participants and their employers is $4,467. The average ranges from $3,040 for the youngest age group to $5,508 for the 55-59 age group. The variation by earnings decile is much greater, as similar contribution rates would imply: the average for the lowest earnings decile is $591 and for the highest decile is $9,399.

Employee contribution and employer matching rates by both earnings decile and age are shown in Appendix Table 3. Employee and employer dollar contributions are shown in Appendix Table 4 by both earnings decile and age.

## C. Estimation

## 1. The Approach

To understand the assumptions we make to simulate 401(k) assets of future retirees, it is useful to consider a cohort representation of the data. Figure 1 shows 401(k) eligibility rates for six cohorts based on SIPP data for 1984, 1987, 1991, and 1993. The cohorts are defined by their age

in 1984, so C(27), for example, means the cohort aged 27 in 1984. (In fact, for the purposes of this figure, each cohort is a group of families with heads born in a five year interval. So the C(27) cohort includes families age 25-29 in 1984, for example.) The C(27) cohort is identified by the square symbols. The eligibility rate of this cohort was less than 10% in 1984 when the cohort was age 27 (on average), but had risen to almost 45% by 1993 when the cohort was 35 years old. A similar increase in eligibility is evident for each of the other five cohorts -- C(32), C(37), C(42), C(45), and C(50). It is also clear that there is a very large "cohort effect": at any age each successively younger cohort has a higher contribution rate than the cohort five years older. This difference is approximately 20 percentage points. For example, 44% of the C27 cohort was eligible when this cohort was 35 years olds. But the rate was only about 20% for the C32 cohort that was 35 five years earlier. The cross-section relationship between age and eligibility can also be identified on the figure and the cross-section relationships in 1984 and 1993 are shown by the solid lines in the figure.

Suppose that we wanted to predict the future 401(k) eligibility of the youngest -- C27 -- cohort. One might be tempted to simply extrapolate the cohort trend to future ages. But it is clear that this could quickly lead to eligibility rates of over 100%. On the other hand, it is equally clear that when the C27 cohort reaches age 40 its eligibility rate will be greater than the rate of the C32 cohort at age 40.

At this point it is useful to revisit the problem of trying to distinguish age, cohort, and year effects. Suppose:

A = age
C = cohort = age in 1984
T = year = calendar year - 1984.

Then A = C + T. In a simple regression, if we relate eligibility to age, cohort, and year, as for example E = aA + cC +tT , it is not possible to isolate all three effects. In particular, it is not possible to identify age, cohort, and year effects for each age, cohort, and year. If one of the variables -- say age -- is parameterized, however, it is in principle possible to identify both cohort and time effects.

We parameterize the relationship between age and eligibility, but we don't try to identify separate cohort and year effects. Instead, we assume that the apparent cohort effects in the figure are time -- or year -- effects and simply represent the spread of 401(k)s with time. With reference to Figure 1, this means that we estimate eligibility by allowing the cross-section relationship to shift upward over time. In fact, even if both cohort and year effects are estimated, the cohort effects are often not statistically different from zero and most of the explanatory power comes from the year effects. We give more details of the specification below.

Now return to the problem of predicting future eligibility of the C(27) cohort in the figure. (When we come to actual simulations, we will in fact work with the C(25) and the C(15) cohorts.) If 401(k) plans continue to spread, then the 1993 relationship between eligibility and age will clearly understate future eligibility of the C(27) cohort as it ages. In part this is simply because the program will undoubtedly continue to expand. But, in addition, the 1993 relationship is determined in part by how the past spread occurred. If for example, the diffusion of plans has been disproportionately in small firms, with younger workers, the cross-section relationship would tend to look as it does in the figure. In the 1993 cross-section there is a noticeable reduction in eligibility with age. This is much less apparent in the 1984 cross-section. Thus we can only use formal estimates as a guide to future patterns. Our approach is to assume that 20 years from now, when members of the C(27)

cohort will be age 55, their eligibility rate will be x% higher than the eligibility rate of the cohort that was 55 in 1993.

To guess at a reasonable value for x, it helps to consider the recent aggregate increase in participants and contributions, as well as the recent increase in eligibility and participation rates, discussed above. These data for 1988 through 1993 are shown in Table 9. The data on aggregate participants and contributions come from so-called Form 5500 reports.[2] According to these data, the number of participants increased over 50% over the five-year period between 1988 and 1993. Employment grew by 4% over this period. The CPS data show a 45% increase in the participation rate, which together with the 4% employment increase is rather consistent with a 52% increase in the number of participants. Aggregate contributions increased by over 76%, much more than the 52% increase in participation. Aggregate earnings increased about 25% over this period, which -- together with a 52% increase in participation -- would imply an increase in aggregate contributions of 77%, if the average fraction of earnings contributed did not change. Taken a face value, this comparison suggests that the fraction of earnings contributed may have increased by as much as 1%. For the illustration at hand, the most relevant number is the 28% increase in the eligibility rate over this recent five-year period.

If the C(27) cohort when it is 55, twenty years from now, will contribute 50% more than 55 year olds contributed in 1993, then the projected "C27" eligibility rates would look something like those shown in Figure 2.

For convenience, we make actual projections for the C(25) cohort, which is just two years younger than the C(27) cohort. In principle, we might suppose that projections for this younger

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cohort would be somewhat higher than those for the C(27) cohort, as depicted in Figure 2 -- showing C(25) rates .05 higher than the C(27) rates. In fact we make projections for this cohort assuming that when its members are 55 -- twenty-two years in the future -- they will contribute 50% more than 55 year olds contributed in 1993. We also want to make a reasonable assessment of eligibility rates for younger generations. Suppose that over the subsequent 10 years, the eligibility rate were to increase 20 percentage points (above the C(25) rate), but the age pattern remained as shown for the "C25" projection. That would yield an eligibility pattern represented by "C15 projected" in Figure 2. The 20 point increase for cohorts 10 years apart is rather modest compared to the approximate 20 point increase for cohorts 5 years apart in Figure 1.

For future reference, we summarize the age-year profiles of the cohorts mentioned above.

| Cohort | Age in 1984 | Age in 1993* | Year will be 55 | Year will be 65 |
|--------|-------------|--------------|-----------------|-----------------|
| C(27) | 27 | 35 | 2013 | 2023 |
| C(25) | 25 | 33 | 2015 | 2025 |
| C(15) | 15 | 23 | 2025 | 2035 |

*Age at the time of the 1993 survey, which is approximated eight years older than the age at the time of the 1984 survey.

To check the implications of our cohort eligibility rates -- together with contribution rates -- against actual 401(k) balances, we will use the cohort data to obtain simulated balances for the HRS respondents. These simulated balances can then be compared to the actual balances of the respondents. The basic method we use, which is described below, is different from the approach used to project for future cohorts, as described above. In this case, the method relies directly on the cohort data as shown in Figure 1. Thus the method can also be explained with reference to Figure 1. The HRS respondents were age 51 to 61 in 1992 -- or 43 to 53 in 1984, which is the first year of

the SIPP data. Thus their past eligibility rates should be reflected approximately in the C(42) and C(52) cohort rates shown in Figure 1. To simulate the HRS respondent balances, we essentially predict their eligibility (and participation) from the past eligibility and participation rates for cohorts in this age range. For example, a person in the HRS sample who was 60 at the time of the survey (in 1992) is a member of the C(52) cohort. The experience of that cohort is use to predict HRS balances for people in that cohort.

In principle, we could go through a similar process for participation given eligibility, and for participation. In practice, we work with the participation rate from the beginning and pass over the decomposition into eligibility and participation given eligibility. We must assume contribution rates of participants, expressed as a fraction of earnings. To make projections like those described above, we use CPS, rather than SIPP, data as a base. Thus it is useful to see the CPS data organized by cohort. Eligibility, participation given eligibility, and participation rates based on these data are shown in Figures 3, 4, and 5 respectively.

## 2.    Fitting Cross-Section Age Profiles

As described in the previous section, we do not make projections by direct extrapolation of an estimated model. Rather, the data are used as a base that can be combined with eligibility and participation assumptions to produce future projections. Perhaps the most important reason for fitting the cross-section profiles is to estimate the relationship between earnings decile and eligibility and participation. We use a specification of the form

$$Y_{it} = \beta_{1t}A + \beta_{2t}A^2 + \sum_{i=1}^{10} \gamma_{it}D_{it} + e_{it}$$

where D is an indicator variable indicating earnings decile and A is age. The most important estimates are the $\gamma_{it}$, which indicate the effect of earnings decile on Y. We have estimated a probit specification of this form for eligibility, participation given eligibility, and participation. The estimates are reported in Appendix Tables 5.

The estimates, like the tabular data above, show large increases in eligibility, participation given eligibility, and participation with earnings decile. The estimates also suggest that the difference by earnings decile, in eligibility and participation rates, increased between 1988 and 1993. The implied age profiles for the 1st, 4th, 7th, and 10th earnings deciles in 1993 are shown in Figures 6, 7, and 8a for eligibility, participation given eligibility, and participation respectively.

**3.    Participation Projections**.

For the projections in this paper, we assume no change in participation rates given eligibility, and therefore the participation and eligibility rate percentage increases are the same. Thus we discuss projections for participation only. Following the approach outlined above, to project future participation rates for the C(25) cohort, we assume that when this cohort is 55 years old (in 2015) it will have participation rates of 50 higher than the participation rate of the cohort that was age 55 in 1993. We further assume that the participation rate at 65 will be five percent higher than this, that is, 55% of the participation rate of the cohort that was age 55 in 1993. Figure 8b is the same as Figure 8a but includes these projections. The projections exhibit a widening difference between the participation rates of high- and low-income families as they age. We believe such spreading is plausible, but the extent of this dispersion of likely to be one of the most uncertain of the projection features.

We also make projections for the C(15) cohort, whose members were 15 years old in 1984. Even looking ahead just 10 years further, however, makes plausible assumptions about what future

401(k) participation even more problematic. Thus we think of these projections as representing what the 401(k) accumulation would be if participation were substantially higher than the C(25) projections, but considerably short of universal coverage. They cannot be taken to be what we believe will happen. These projections are based on the assumption that participation rates for the median wage earner are 20 percentage points greater than the C(25) rates. Rates for the highest and lowest decile increase somewhat less than this.[3] Figure 8c shows the C(15) projections in comparison to those for the C(25) cohort. Finally, we make projections assuming universal 401(k) participation.

## III. PROJECTED 401(k) BALANCES AND COMPARISON WITH HRS SAMPLE

### A. Wealth of the HRS Respondents

To judge the relative importance of potential 401(k) contributions, we compare projected 401(k) assets of future generations with the current (1992) assets of the HRS sample. The 1992 assets of the HRS respondents when they were age 51 to 61 are shown in Table 10, by earnings decile. As is typically true for wealth data, there is a very large difference between mean and median assets, especially for financial assets. For example, the mean of all personal financial assets is $30,465 and the mean of 401(k) assets is $10,808. The medians are $3,200 and zero respectively -- fewer than half of HRS respondents have 401(k) accounts. The 401(k) projections discussed below are based on averages -- e.g. estimates of average contribution rates -- and thus can only be compared to the HRS means. We do not capture the substantial differences that are likely between mean and median values within earnings deciles. The principle comparison we make is with Social Security wealth, however, and the means and medians of Social Security assets do not differ greatly. Social Security wealth is evaluated by estimating the accrued wealth at age 65, were the person to work

until that age.[4] These accrued levels are converted to 1992 dollars using the Social Security Administration's intermediate forecast of the average annual interest rate provided by the Board of Trustees of the OASDI trust fund. For comparability, the projected 401(k) balances discussed below are also assume that a person works until age 65. The actual HRS 401(k) balances reported in Table 10, however, are 1992 balances when the respondents were 51 to 61. Personal retirement balances could easily double by the time the respondents attain age 65.

## B. Estimation of Earnings Histories

We need earnings histories to project 401(k) assets of future cohorts of families -- like those in the HRS sample, but who have different 401(k) participation rates. We have divided the HRS sample into earnings deciles according to their 1992 earnings. In principle, the Social Security earnings histories of the HRS respondents can be used to determine average earnings by age withing each decile. As discussed by Venti and Wise [1997], however, there is one important limitation to this method: historical earnings are reported only up to the Social Security earnings limit. Actual earnings in the top two or three deciles may be substantially higher than Social Security reported earnings.

Because of this limitation of the Social Security data, we make calculations based on the annual March CPSs which report earnings well above the Social Security maximum.[5] This is the procedure we use: (1) We identify earnings deciles, as described above, using the 1992 earnings of each HRS family. (2) Using the annual March CPSs we calculate earnings deciles by age for the years 1964-91. Using published data on median earnings prior to 1964, we extrapolate this series back to 1956. Thus we obtain CPS earnings histories by decile for the years 1956 to 1991. (3) We assign each HRS household to a CPS decile according to the household's 1992 earnings decile. The CPS earnings histories begin at age 25 and a given household is assumed to have been in the same

decile since age 25. As described in the next two sections, we use these earnings profiles, together with projected 401(k) participation and contributions rates and rate of return assumptions, to calculate accumulated 401(k) assets through age 65.

## C.    HRS 401(k) Assets and Cohort Data

Before projecting the 401(k) accumulation of future cohorts, we first determine the extent to which the current 401(k) balances of HRS respondents appear to be consistent with the SIPP cohort data on participation, together with the CPS data on contributions. While the extent of this correspondence is not necessarily an indicator of the confidence that should be attached to our projections, we are inclined to give more credence to the projections if the cohort data that serve as a basis for our projection assumptions are roughly consistent with the HRS balances with which they can be compared.

When the 401(k) program began in 1982, members of the 1992 HRS sample were 41 to 51 years old. Suppose that in 1982 these families began to participate in 401(k) plans at rates estimated from the SIPP and to contribute at rates estimated from the CPS. We ask how close simulated balances based on these assumptions are to the actual 1992 balances of the HRS respondents. We first use the SIPP data to estimate participation profiles by age for each of two cohorts from whose members the HRS respondents were drawn: the cohorts whose members were 51 to 55 and 56 to 60 in 1992 -- at the time of the HRS. The SIPP estimates allow us to predict the probability of participation for each HRS family beginning in 1982, when 401(k)s were first available and when the two HRS cohorts were age 41 to 45 and 46 to 50 respectively.

To estimate contributions, we use family earnings histories, derived as described above. Within each earnings decile, beginning in 1982, we randomly assign families to participation status, based on SIPP estimates of participation by age and earnings decile for each of the two cohorts.[6]

Based on our estimates from the CPS data, we assume a contribution rate of 8%. This is somewhat less that the average rate of 8.7% -- including both employee and employer matching contributions -- estimated for 1993 from the CPS data. There is some evidence that earlier contribution rates were lower than this, as explained in the appendix. In the projections for future cohorts discussed below, we assume a contribution rate of 9%.

We calculate accumulated 401(k) balances for three different rates of return: the observed return on corporate bonds in each year, the return on large company stocks in each year, and the return assuming the contributor invests half in bonds and half in stocks. The observed rates of return are compiled from Ibbotson [1997]. Some families invest 401(k) assets in money market funds and may obtain returns lower than any of these.

Simulated 401(k) balances through 1992 are shown in Table 11, by earnings decile, along with the actual reported 401(k) balances of the HRS respondents. On average the simulated values do not differ greatly from the observed balances reported in the HRS. Using the bond rate of return seems to give the closest match. Even the simulated balances by earnings decile are typically not far from the HRS reported balances. This exercise must necessarily be tentative. By assuming a different contribution rate, for example, we would realize a different correspondence between simulated and reported values. As a basis for judgements about the future, the results help to give some credence to short run projections, but future behavior could be very different from reasonable expectations based on historical trends. For example, contribution rates could be substantially different from 1993 rates.

## D.    401(k) Assets of Future Generations

Taking the lifetime earnings described above to be the actual past earnings of the HRS families, we estimate what they would have accumulated in a 401(k) had they had the participation rates that we project for the C(25) and the C(15) cohorts, and had there been universal 401(k) coverage. (The members of the C(25) cohort were 33 in 1993 and the members of the C(15) cohort were 23 in 1993.) As above, we suppose that once contributions begin they continue until retirement, at age 65. Within an earnings decile, we probabilistically assign persons to a beginning participation age, as discussed in the previous section. So, for example, say the projected participation rate at 25 is 35%. We randomly assign a fraction .35 to begin at that age. If the projected rate at 26 is 35.5%, we randomly assign .005 to start contributing at 26, and so forth. And, once a family starts to contribute we assume participation will continue in subsequent years. Some will never be assigned to participation status.

We assume a family contribution rate (including employee plus employer contributions) of 9%, based on CPS rates for 1993 discussed above. Our intention is that the C(25) projection in particular be a conservative estimate of what actual participation is likely to be. The C(15) projection may also be conservative, but that is harder to judge.

For each of the projections, we assume three different rates of return: the average rate of return on corporate bonds since 1926 (6%), the average rate of return on the S&P 500 over the same period (12.7%), and the rate of return assuming that a person is invested half in bonds and half in the S&P 500.

The results for these three projections are reported in Table 12. As indicated above, our estimates of historical participation and contribution rates, and thus our projections, are based on means. The comparable HRS 401(k) and Social Security assets, shown in the first two columns of

the table, are also means. The 401(k) assets, however, are accumulated tax free; taxes would be paid when funds are withdrawn. No tax will be paid on most Social Security benefits.

The cohort 25 projections yield 401(k) assets at retirement ranging from $50,111 to $181,567 depending on the rate of return. These levels are very large relative to average Social Security wealth of $103,392 and are much larger than the HRS respondent mean 401(k) balance of $10,808 in 1992, when the respondents were 51 to 61. Under the cohort 15 assumptions, the means range from $66,765 to $256,056. Universal coverage would yield mean 401(k) balances at age 65 ranging from $109,439 to $443,005 to $480,798, depending on the rate of return.

For each projection, however, the ratio of projected 401(k) to Social Security wealth varies a great deal depending on lifetime earnings. Perhaps the easiest way to see this is by looking at Figures 9a through 9c, which show projected 401(k) assets and Social Security wealth by earnings decile for each of the projections. Because the C(25) projections assume continued very low participation rates in the lowest income deciles, the 1st and 2nd deciles accumulate very little in 401(k) assets, no matter what the rate of return. Beginning with the 3rd decile, however, 401(k) assets at retirement would likely be substantial relative to Social Security wealth, and for families with incomes above the median 401(k) balances would be likely to exceed Social Security wealth. (The increase in Social Security wealth with earnings is very small once earnings exceed the 4th earnings decile. Thus it is not surprising that saving based on a percent of income would exceed Social Security wealth at higher income levels.)

The C(15) projections imply substantially large 401(k) assets, relative to Social Security wealth, for the lower earnings deciles. Under these projections, even the families in the 2nd decile could accumulate 401(k) assets that could be an important fraction of Social Security wealth. Universal coverage could yield 401(k) assets that would exceed Social Security wealth in every lifetime earnings decile. And, 401(k) assets would almost surely represent an important share of Social Security wealth even in the lowest decile.

As emphasized above, however, the projected differences in participation rates by earnings decile could well be far from realized experience, even if the average participation rates are realistic. Our sense is that the current C(25) projections underestimate future 401(k) participation by low-income households. There seems to be no way to convincingly narrow this uncertainty. Of course, simulating results under alternative assumptions could provide further information about the implications of different rates of participation dispersion by earnings decile.

## E.    RISK

A concern about individual retirement saving is the risk associated with fluctuation in the rate of return. Of course there are also important risks associated with conventional employer-provided pension plans and government programs such as Social Security as well, but they may be more difficult to evaluate. We can however provide an empirical measure of the rate of return risk associated with private saving accounts. To do this, we have calculated the asset accumulation that would been realized under the C(25) assumptions, but based on the range of actual returns from 1926 to 1996. We calculate the asset accumulation that would have resulted over each 40-year career: the first beginning in 1926 and the last beginning in 1956. We do this for each of the investment options used above: bonds, the S&P 500, and half-and-half. This is very similar to the procedure followed

by MaCurdy and Shoven [1992] to explore the returns on stock verus bond investments through TIAA-CREF.

The results are shown in Figure 10. The median accumulation from stock investment is almost four times as large as the median return from bond investment. Yet the relative range of accumulations is much greater for bonds than for stocks. The largest bond accumulations are about four times as large as the smallest. The largest stock accumulations are about twice as large as the smallest accumulations. Put another way, a bond investor counting on the median could end up with half that much or twice that much. On the other hand, a stock investor counting on the median could end up with one-third less or one-third more than the median. Indeed, of the 31 possible 40-year careers since 1926, the lowest stock accumulation is about the same as the highest bond accumulation!

Whether this suggests high or low risk is a matter of opinion. It does not seem large relative to job change or job loss risk associated with defined benefit pension plans, for example. Job change could easily lead to benefits less than half of benefits that would result from a lifetime career in the same firm. Samwick and Skinner [1995] conclude that ....... Persons who started work in 1956 are now receiving Social Security benefits that are much higher than they would have received under 1956 Social Security provisions. In many countries, it is likely that future Social Security benefits will be much less than those provided under current legislation. Perhaps the issue is not that some forms of preparation for retirement are risky while others aren't, but rather how future retirees might best gain maximum returns on average while protecting themselves against very bad outcomes.

## IV. CONCLUSIONS

We have projected the accumulation of 401(k) assets at retirement for the cohort that was 25 in 1984 and the cohort that was age 15 in 1984. The cohort 25 projections are based on what we

hope are plausible assumptions about future 401(k) participation rates. Indeed, our intention is that these projections be conservative and thus likely to underestimate realized contributions. The cohort 15 projections are further from historical rates, but we hope are also based on plausible assumptions about potential future participation. We are, however, more uncertain about the correspondence between projected rates and actual realized contributions for the C(15) cohort; actual participation could easily exceed or fall short of these projections. For comparison, we have also made projections assuming universal 401(k) coverage.

In each case, the accumulation of 401(k) assets is large compared to current wealth at retirement. Because a large fraction of current retirees depend almost entirely on Social Security benefits for support in retirement, we have compared future 401(k) assets to Social Security wealth. Our cohort 25 projections suggest that when this cohort reaches retirement age -- they will be 65 in 2025 — their average 401(k) assets are likely to exceed their average Social Security assets. But the projections also suggest that relative to Social Security wealth, 401(k) assets will vary a great deal with lifetime earnings. While this is surely true, we are quite uncertain about the exact magnitude of the variation by earnings decile. The projections suggest that the lowest earnings decile may have very little in 401(k) assets. But for families with lifetime earnings above the lowest two or three deciles, 401(k) assets are likely to be a substantial fraction of Social Security wealth. For families with lifetime earnings above the median, 401(k) assets could exceed Social Security wealth and this would almost surely be true for families in the top four earnings deciles.

Universal 401(k) participation would likely yield 401(k) assets at retirement greater than Social Security wealth for all but the lowest lifetime earnings decile, and possibly for the lowest decile as well. The intermediate C(15) projections yield 401(k) accumulations that could represent

a substantial fraction of Social Security wealth for lifetime earnings histories as low as the second decile.

Thus we believe that 401(k) assets will almost surely be an important component of the retirement wealth of future generations of retirees and could be the dominant component for a large fraction of them.

Footnotes

1. The IRA program was in fact first introduced for persons without employer-provided pensions in 1974 and were expanded to include all employees in 1981 legislation. The 401(k) program was introduced in 1978 but was not used until IRS clarifying regulations were adopted in 1981.

2. See U.S. Department of Labor [1977]. The Form 5500 Reports tabulate contributions to private sector 401(k) plans. They do not include contributions to related 457 (public sector) or 403(b) (non-profit) plans, nor do they include contributions to 401(k) plans by public sector employees.

3. The actual procedure was to add a constant term to the probit equation used to describe the C(25) projections that would increase the C(25) projections for the 5th and 6th income deciles by 20 percentage points. The same constant term was added to the probit equations for each of the other deciles. The highest deciles don't increase by 20 points because of the upper limit of 100 percent. The lower deciles are increased less than 20 points–becauseof the properties of the probit functional form–but, relative to the C(25) projections, much more than the higher deciles.

4. A family's Social Security wealth is the simple sum of the mortality weighted present value of each member's benefit stream. We do not consider here the present value for a single family member including survivor benefits.

5. The ratio of the CPS maximum to the Social Security maximum has ranged from a low of just under 2 in 1981 to a high of over 20 in 1964. In 1991 the CPS reported earnings up to a

maximum of $200,000; the Social Security maximum was $53,400 in that year.

6. As a means of estimation, we actually construct a "synthetic HRS" sample of persons age 41 to 51 in each of the 10 earnings deciles in 1982. This sample is "aged" through 1992, assigning families to participate and contribute to a 401(k) at rates determined by the estimates from the SIPP and the CPS. The estimated age-participation profiles are used to determine which sample members contribute in 1982 and in subsequent years. Once a family contributes, we assume the family continues to contribute in subsequent years. Thus if the estimated participation rate for a particular age and earnings decile is 10% in 1982 we randomly assign 10% of the families to begin contributing in 1982. If the probability is 11% in 1983, then another 1% are randomly chosen to begin contributing in that year.

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## DATA APPENDIX

The three principal data sources used in the analysis are the Survey of Earnings and Program Participation (SIPP), the Current Population Survey (CPS), and the CPS Supplemental Survey of Employee Benefits. The unit of observation in each of these surveys is the person. For the present analysis we have grouped the individual data to obtain data for family units, by matching married partners in the sample. A family is included in the sample if it meets the following criteria:

- head age 25-65.

- at least one family member is employed.

- earnings are available for both family members.

A family participates (or is eligible) if at least one member participates (or is eligible). Based on the CPS data, the 401(k) contribution and the employer matching contribution are both calculated at the person-level and then aggregated to obtain family amounts. Details on each of the samples are presented below.

## CPS

We use the May 1988 and April 1993 surveys. Several missing data issues had to be addressed:

1.      The data on 401(k) participation and eligibility come from two questions asked of currently employed workers. Respondents are first asked if they participate. If they answer 'no' or 'don't know' they are than asked if their employer offered a 401(k) plan. 11.5% of the respondents who said they did not participate in a 401(k) did not know if their employer offered such a plan. We have chosen to treat these 'DK' responses as missing data for the eligibility calculations only. One consequence is that the sample used in "participant" calculations will exceed the sample used for

"eligible" calculations. Also, since information on eligibility is only missing for non-participants (all participants are eligible), it is likely that the conditional participation rate is biased upwards.

2.     The percent of Gross Pay Contributed to a 401(k): In both years slightly over 25% of the 401(k) participants failed to answer this question. To impute these missing amounts we calculated a table of percent of gross pay contributed by five year age intervals from the nonmissing observations. This table was used to impute the missing observations.

3.     The employer match percent (1993 only):  Respondents were asked "If you were to contribute $100 to this plan, how much would your employer contribute?" About 65% of the sample provided a dollar amount, another 17% indicated that their employer matched, but could not provide an amount. The remaining 17% of the sample failed to answer the question. To impute dollar amounts for all participants we tabulated dollar amounts by five year age intervals for the 65% of the sample providing a complete answer. If a respondent indicated that their employer matched, but could not provide an amount we imputed an amount using the mean by age interval from the distribution of matching amounts greater than zero. If a respondent failed to answer the question we imputed the amount from the distribution of matches including zero match rates.

**SIPP**

We used data from the 1984, 1985, 1986, 1990, 1991, and 1992 panels of the SIPP. Since the SIPP panels are overlapping we are sometimes able to obtain data for a single time period from more than one panel. The panels that were used, the survey wave within each panel, and the interview months corresponding to each panel are:

| panel | wave | interview months |
|-------|------|------------------|
| 1984 | 4 | Sept.-Dec. 1984 |
| 1985 | 7 | Jan.-April 1987 |
| 1986 | 4 | Jan.-April 1987 |
| 1990 | 4 | Feb.-May 1991 |
| 1991 | 7 | Feb.-May 1993 |
| 1992 | 4 | Feb.-May 1993 |

There are approximately 28 months separating the 1984 and the 1987 interview. In the cohort analyses we treat this interval as a two-year period. The 1984 to 1991 interval is assumed to span six years. The 1984 to 1993 interval is assumed to span eight years.

## SIPP vs CPS

The SIPP responses imply eligibility and participation rates somewhat below those found in the CPS (See Table x in the text). The difference may be due in part to the more inclusive wording of the 401(k) questions in the CPS. The SIPP asks:

> Does your employer offer a 401(k) or thrift plan? Such a plan allows employees to defer part of their salary and not have to pay taxes on the deferred salary until they retire or withdraw the money.

If the respondent answers "yes", then the following question is asked:

> Does the respondent participate in this plan?

As noted above, the CPS reverses the order and inquires about participation first (1993 version):

> Some retirement plans allow workers to make tax-deferred contributions to the plan. For example, you might choose to have your employer put part of your salary into a retirement savings account and then you don't pay earnings taxes on this money until you take it out or retire, These plans are called by different names, including 401(k) plans, pre-tax plans, salary reduction plans, and 403(b) plans. Do you participate in a plan like this?

If the respondent answers "no" or "don't know", then:

> Does your employer offer you a plan like this? (emphasis in original)

**HRS**

The HRS does not inquire about eligibility for a 401(k) plan. It does ask about participation. All employed persons are asked if they are "included in any such pension, retirement, or tax-deferred plan with their employer?" If yes, they are asked to distinguish between defined benefit ("benefits are usually based on a formula involving age, years of service, and salary") and defined contribution ("money is accumulated in an account for you") type plans. If they indicate coverage by a DC plan they are prompted to distinguish between 401(k) and non-401(k) plans. For a number of reasons some respondents were able to indicate coverage by a DC plan, but could not distinguish between a 401(k) and a traditional DC plan. We treat these respondents as not participating in a 401(k) plan. The principal categories of DC plan types are "thrift or savings", "401(k), 403(b), or SRA", "profit sharing or ESOP", and "other". It is perhaps unclear to the respondent whether the "thrift or saving" category includes 401(k)-type plans. We have included them as 401(k) plans.

| Age | Year | | | |
|---|---|---|---|---|
| | 1984 | 1987 | 1991 | 1993 |
| **Eligibility** | | | | |
| 25-29 | 0.089 | 0.142 | 0.228 | 0.406 |
| 30-34 | 0.130 | 0.169 | 0.307 | 0.434 |
| 35-39 | 0.132 | 0.202 | 0.354 | 0.444 |
| 40-44 | 0.151 | 0.225 | 0.379 | 0.461 |
| 45-49 | 0.146 | 0.203 | 0.344 | 0.441 |
| 50-54 | 0.129 | 0.219 | 0.359 | 0.423 |
| 55-59 | 0.152 | 0.186 | 0.305 | 0.377 |
| 60-64 | 0.091 | 0.151 | 0.233 | 0.297 |
| All | 0.126 | 0.185 | 0.317 | 0.423 |
| **Participation Given Eligibility** | | | | |
| 25-29 | 0.476 | 0.498 | 0.690 | 0.556 |
| 30-34 | 0.498 | 0.540 | 0.729 | 0.630 |
| 35-39 | 0.469 | 0.583 | 0.695 | 0.630 |
| 40-44 | 0.607 | 0.673 | 0.671 | 0.645 |
| 45-49 | 0.632 | 0.689 | 0.683 | 0.693 |
| 50-54 | 0.674 | 0.634 | 0.735 | 0.684 |
| 55-59 | 0.721 | 0.716 | 0.692 | 0.671 |
| 60-64 | 0.627 | 0.715 | 0.746 | 0.649 |
| All | 0.570 | 0.613 | 0.700 | 0.638 |
| **Participation** | | | | |
| 25-29 | 0.04 | 0.071 | 0.157 | 0.226 |
| 30-34 | 0.064 | 0.091 | 0.224 | 0.274 |
| 35-39 | 0.062 | 0.117 | 0.246 | 0.280 |
| 40-44 | 0.092 | 0.151 | 0.255 | 0.297 |
| 45-49 | 0.092 | 0.140 | 0.235 | 0.305 |
| 50-54 | 0.087 | 0.139 | 0.264 | 0.290 |
| 55-59 | 0.110 | 0.133 | 0.211 | 0.253 |
| 60-64 | 0.057 | 0.108 | 0.174 | 0.193 |
| All | 0.072 | 0.113 | 0.222 | 0.270 |

**Table 1. Eligibility, Participation Given Eligibility, and Participation Rates, by Age and Year, Based on the SIPP**

## Table 2.  Eligibility, Participation Given Eligibility, and Participation Rates, by Earnings Decile and Year, Based on the SIPP

| Earnings Decile | Year | | | |
|---|---|---|---|---|
| | 1984 | 1987 | 1991 | 1993 |
| **Eligibility** | | | | |
| 1st -- Lowest | 0.035 | 0.046 | 0.071 | 0.166 |
| 2nd | 0.052 | 0.065 | 0.152 | 0.231 |
| 3rd | 0.070 | 0.108 | 0.208 | 0.298 |
| 4th | 0.082 | 0.124 | 0.240 | 0.37 |
| 5th | 0.114 | 0.154 | 0.305 | 0.41 |
| 6th | 0.134 | 0.179 | 0.366 | 0.468 |
| 7th | 0.143 | 0.228 | 0.408 | 0.525 |
| 8th | 0.166 | 0.276 | 0.444 | 0.557 |
| 9th | 0.213 | 0.322 | 0.474 | 0.602 |
| 10th -- Highest | 0.23 | 0.322 | 0.481 | 0.589 |
| All | 0.126 | 0.185 | 0.317 | 0.423 |
| **Participation Given Eligibility** | | | | |
| 1st -- Lowest | 0.448 | 0.524 | 0.650 | 0.437 |
| 2nd | 0.616 | 0.517 | 0.651 | 0.483 |
| 3rd | 0.429 | 0.551 | 0.629 | 0.520 |
| 4th | 0.514 | 0.561 | 0.649 | 0.515 |
| 5th | 0.463 | 0.525 | 0.595 | 0.570 |
| 6th | 0.515 | 0.618 | 0.671 | 0.614 |
| 7th | 0.493 | 0.592 | 0.721 | 0.651 |
| 8th | 0.584 | 0.615 | 0.705 | 0.68 |
| 9th | 0.64 | 0.619 | 0.749 | 0.751 |
| 10th -- Highest | 0.692 | 0.728 | 0.798 | 0.777 |
| All | 0.570 | 0.613 | 0.700 | 0.638 |
| **Participation** | | | | |
| 1st -- Lowest | 0.02 | 0.024 | 0.046 | 0.072 |
| 2nd | 0.032 | 0.034 | 0.099 | 0.111 |
| 3rd | 0.030 | 0.060 | 0.131 | 0.155 |
| 4th | 0.042 | 0.069 | 0.156 | 0.191 |
| 5th | 0.053 | 0.081 | 0.181 | 0.231 |
| 6th | 0.069 | 0.111 | 0.246 | 0.288 |
| 7th | 0.070 | 0.135 | 0.294 | 0.34 |
| 8th | 0.097 | 0.170 | 0.313 | 0.38 |
| 9th | 0.136 | 0.199 | 0.355 | 0.45 |
| 10th -- Highest | 0.162 | 0.234 | 0.384 | 0.46 |
| All | 0.072 | 0.113 | 0.222 | 0.27 |

| Table 3. Eligibility, Participation Given Eligibility, and Participation Rates, by Age and Year, Based on the CPS | | |
|:---:|:---:|:---:|
| Age | Year | |
| | 1988 | 1993 |
| **Eligibility** | | |
| 25-29 | 0.344 | 0.461 |
| 30-34 | 0.410 | 0.515 |
| 35-39 | 0.459 | 0.521 |
| 40-44 | 0.424 | 0.546 |
| 45-49 | 0.423 | 0.531 |
| 50-54 | 0.433 | 0.487 |
| 55-59 | 0.393 | 0.450 |
| 60-64 | 0.318 | 0.413 |
| All | 0.404 | 0.501 |
| **Participation Given Eligibility** | | |
| 25-29 | 0.551 | 0.588 |
| 30-34 | 0.580 | 0.673 |
| 35-39 | 0.596 | 0.700 |
| 40-44 | 0.612 | 0.740 |
| 45-49 | 0.723 | 0.744 |
| 50-54 | 0.702 | 0.771 |
| 55-59 | 0.683 | 0.799 |
| 60-64 | 0.705 | 0.763 |
| All | 0.624 | 0.708 |
| **Participation** | | |
| 25-29 | 0.170 | 0.241 |
| 30-34 | 0.215 | 0.318 |
| 35-39 | 0.252 | 0.344 |
| 40-44 | 0.243 | 0.373 |
| 45-49 | 0.294 | 0.375 |
| 50-54 | 0.280 | 0.350 |
| 55-59 | 0.250 | 0.336 |
| 60-64 | 0.206 | 0.286 |
| All | 0.232 | 0.328 |

| Table 4. Eligibility, Participation Given Eligibility, and Participation Rates, by Earnings Decile and Year, Based on the CPS | | |
|---|---|---|
| Earnings Decile | Year | |
| | 1988 | 1993 |
| **Eligibility** | | |
| 1st -- Lowest | 0.148 | 0.169 |
| 2nd | 0.227 | 0.249 |
| 3rd | 0.305 | 0.363 |
| 4th | 0.378 | 0.477 |
| 5th | 0.386 | 0.495 |
| 6th | 0.435 | 0.529 |
| 7th | 0.469 | 0.628 |
| 8th | 0.527 | 0.665 |
| 9th | 0.557 | 0.712 |
| 10th -- Highest | 0.600 | 0.715 |
| All | 0.404 | 0.501 |
| **Participation Given Eligibility** | | |
| 1st -- Lowest | 0.425 | 0.357 |
| 2nd | 0.477 | 0.498 |
| 3rd | 0.540 | 0.592 |
| 4th | 0.520 | 0.625 |
| 5th | 0.600 | 0.629 |
| 6th | 0.593 | 0.686 |
| 7th | 0.647 | 0.757 |
| 8th | 0.665 | 0.776 |
| 9th | 0.673 | 0.808 |
| 10th -- Highest | 0.773 | 0.837 |
| All | 0.624 | 0.708 |
| **Participation** | | |
| 1st -- Lowest | 0.055 | 0.052 |
| 2nd | 0.097 | 0.109 |
| 3rd | 0.146 | 0.186 |
| 4th | 0.177 | 0.272 |
| 5th | 0.208 | 0.290 |
| 6th | 0.243 | 0.335 |
| 7th | 0.281 | 0.446 |
| 8th | 0.330 | 0.484 |
| 9th | 0.358 | 0.548 |
| 10th -- Highest | 0.437 | 0.580 |
| All | 0.232 | 0.328 |

| Age or Earnings Decile | Measure and Survey | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | Eligibility | | Participation Given Eligibility | | Participation | |
| | SIPP | CPS | SIPP | CPS | SIPP | CPS |
| **By Age** | | | | | | |
| 25-29 | 0.406 | 0.461 | 0.556 | 0.588 | 0.226 | 0.24 |
| 30-34 | 0.434 | 0.515 | 0.630 | 0.673 | 0.274 | 0.32 |
| 35-39 | 0.444 | 0.521 | 0.630 | 0.700 | 0.280 | 0.34 |
| 40-44 | 0.461 | 0.546 | 0.645 | 0.740 | 0.297 | 0.37 |
| 45-49 | 0.441 | 0.531 | 0.693 | 0.744 | 0.305 | 0.38 |
| 50-54 | 0.423 | 0.487 | 0.684 | 0.771 | 0.290 | 0.350 |
| 55-59 | 0.377 | 0.450 | 0.671 | 0.799 | 0.253 | 0.336 |
| 60-64 | 0.30 | 0.41 | 0.65 | 0.76 | 0.19 | 0.29 |
| All | 0.423 | 0.501 | 0.638 | 0.708 | 0.270 | 0.33 |
| **By Earnings Decile** | | | | | | |
| 1st -- Lowest | 0.17 | 0.169 | 0.437 | 0.357 | 0.07 | 0.05 |
| 2nd | 0.23 | 0.25 | 0.483 | 0.498 | 0.111 | 0.109 |
| 3rd | 0.298 | 0.36 | 0.52 | 0.59 | 0.16 | 0.19 |
| 4th | 0.37 | 0.477 | 0.515 | 0.625 | 0.191 | 0.272 |
| 5th | 0.41 | 0.50 | 0.570 | 0.629 | 0.231 | 0.290 |
| 6th | 0.468 | 0.53 | 0.61 | 0.69 | 0.29 | 0.34 |
| 7th | 0.525 | 0.628 | 0.651 | 0.757 | 0.342 | 0.45 |
| 8th | 0.557 | 0.665 | 0.683 | 0.776 | 0.381 | 0.484 |
| 9th | 0.602 | 0.712 | 0.751 | 0.808 | 0.452 | 0.548 |
| 10th -- Highest | 0.589 | 0.715 | 0.777 | 0.837 | 0.458 | 0.580 |
| All | 0.423 | 0.501 | 0.638 | 0.708 | 0.270 | 0.33 |

**Table 5. SIPP and CPS Compared: Eligibility, Participation Given Eligibility, and Participation Rates, by Age and by Earnings Decile, for 1993**

| Age or Earnings Decile | Measure and Survey | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Eligibility | | | Participation Given Eligibility | | | Participation | | |
| | SIPP | CPS | HRS | SIPP | CPS | HRS | SIPP | CPS | HRS |
| **By Age** | | | | | | | | | |
| 51-55 | 0.43 | 0.466 | - | 0.67 | 0.771 | - | 0.29 | 0.334 | 0.292 |
| 56-61 | 0.35 | 0.45 | - | 0.67 | 0.776 | - | 0.236 | 0.32 | 0.22 |
| All | 0.391 | 0.456 | - | 0.669 | 0.77 | - | 0.261 | 0.33 | 0.26 |
| **By Earnings Decile** | | | | | | | | | |
| 1st -- Lowest | 0.14 | 0.115 | - | 0.42 | 0.559 | - | 0.06 | 0.057 | 0.027 |
| 2nd | 0.20 | 0.204 | - | 0.494 | 0.655 | - | 0.101 | 0.119 | 0.093 |
| 3rd | 0.282 | 0.297 | - | 0.611 | 0.679 | - | 0.173 | 0.175 | 0.152 |
| 4th | 0.364 | 0.416 | - | 0.596 | 0.659 | - | 0.217 | 0.251 | 0.219 |
| 5th | 0.388 | 0.425 | - | 0.553 | 0.712 | - | 0.215 | 0.297 | 0.228 |
| 6th | 0.424 | 0.535 | - | 0.635 | 0.771 | - | 0.269 | 0.368 | 0.292 |
| 7th | 0.488 | 0.609 | - | 0.662 | 0.837 | - | 0.323 | 0.470 | 0.33 |
| 8th | 0.488 | 0.636 | - | 0.741 | 0.812 | - | 0.362 | 0.492 | 0.37 |
| 9th | 0.576 | 0.684 | - | 0.791 | 0.808 | - | 0.46 | 0.531 | 0.44 |
| 10th -- Highest | 0.561 | 0.657 | - | 0.797 | 0.862 | - | 0.45 | 0.554 | 0.45 |
| All | 0.391 | 0.456 | - | 0.669 | 0.773 | - | 0.261 | 0.329 | 0.26 |

**Table 6. SIPP and CPS Compared with HRS: Eligibility, Participation Given Eligibility, and Participation Rates, by Age and by Earnings Decile, 1993 for SIPP and HRS and 1992 for HRS**

| Age or Earnings Decile | Measure and Survey | | |
|---|---|---|---|
| | Employee Contribution | Employer Matching Rate | Total Contribution Rate |
| **Table 7. Employee Contribution Rates and Employer Matching Rates, by Age and by Earnings Decile, for 1993, Based on the CPS.** | | | |
| **By Age** | | | |
| 25-29 | 0.056 | 0.029 | 0.086 |
| 30-34 | 0.056 | 0.028 | 0.084 |
| 35-39 | 0.054 | 0.025 | 0.080 |
| 40-44 | 0.059 | 0.024 | 0.083 |
| 45-49 | 0.063 | 0.027 | 0.090 |
| 50-54 | 0.064 | 0.025 | 0.089 |
| 55-59 | 0.069 | 0.030 | 0.099 |
| 60-64 | 0.074 | 0.031 | 0.106 |
| All | 0.060 | 0.027 | 0.087 |
| **By Earnings Decile** | | | |
| 1st -- Lowest | 0.064 | 0.031 | 0.095 |
| 2nd | 0.062 | 0.029 | 0.092 |
| 3rd | 0.058 | 0.031 | 0.089 |
| 4th | 0.061 | 0.029 | 0.090 |
| 5th | 0.063 | 0.025 | 0.088 |
| 6th | 0.061 | 0.026 | 0.087 |
| 7th | 0.057 | 0.025 | 0.082 |
| 8th | 0.061 | 0.026 | 0.087 |
| 9th | 0.057 | 0.024 | 0.080 |
| 10th -- Highest | 0.062 | 0.030 | 0.092 |
| All | 0.060 | 0.027 | 0.087 |

| Table 8. Employee and Employer Contribution Amounts, by Age and by Earnings Decile, for 1993, Based on the CPS. | | | |
|---|---|---|---|
| Age or Earnings Decile | Source | | |
| | Employee | Employer | Total |
| **By Age** | | | |
| 25-29 | 2048 | 992 | 3040 |
| 30-34 | 2468 | 1165 | 3633 |
| 35-39 | 2832 | 1534 | 4366 |
| 40-44 | 3455 | 1444 | 4899 |
| 45-49 | 3700 | 1606 | 5306 |
| 50-54 | 3410 | 1339 | 4749 |
| 55-59 | 3837 | 1670 | 5508 |
| 60-64 | 3451 | 1477 | 4928 |
| All | 3075 | 1392 | 4467 |
| **By Earnings Decile** | | | |
| 1st -- Lowest | 404 | 186 | 591 |
| 2nd | 805 | 363 | 1167 |
| 3rd | 1122 | 589 | 1711 |
| 4th | 1522 | 732 | 2254 |
| 5th | 1911 | 731 | 2642 |
| 6th | 2162 | 898 | 3060 |
| 7th | 2394 | 1059 | 3453 |
| 8th | 3113 | 1322 | 4434 |
| 9th | 3612 | 1483 | 5095 |
| 10th -- Highest | 6258 | 3141 | 9399 |
| All | 3075 | 1392 | 4467 |

| Table 9. Aggregate 401(k) Participants and Contributions, 1988-1993. | | | | | |
|---|---|---|---|---|---|
| | From Form 5500 | | From CPS | | |
| Year | Participants (millions) | Contributions (billions) | Eligibility Rate | Participation Given Eligibility | Participation Rate |
| 1988 | 15.203 | 39.412 | 0.380 | 0.630 | 0.229 |
| 1989 | 17.337 | 46.081 | -- | -- | -- |
| 1990 | 19.548 | 48.998 | -- | -- | -- |
| 1991 | 19.126 | 51.533 | -- | -- | -- |
| 1992 | 22.404 | 64.345 | -- | -- | -- |
| 1993 | 23.138 | 69.322 | 0.486 | 0.713 | 0.332 |
| Percent Change 1988-1993 | 52.20% | 75.90% | 28% | 13% | 45% |

| Table 10. Mean and Median 1992 Assets of HRS Respondents, by Earnings Decile and Category | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Asset Category | | | | | | | |
| Earnings Decile | Total Wealth | Total Wealth Excl SS | Total Retirement Excl SS | Employer Pension Assets | Total Personal Retirement | Non-Retirement Financial | 401(k) Assets | Social Security Wealth |
| **Means** | | | | | | | | |
| 1st | 270238 | 208721 | 48841 | 39162 | 9679 | 44964 | 620 | 61517 |
| 2nd | 228538 | 154438 | 51117 | 40002 | 11114 | 27692 | 1025 | 74100 |
| 3rd | 251170 | 167115 | 44251 | 34394 | 9857 | 27194 | 2648 | 84055 |
| 4th | 269872 | 176423 | 47335 | 36749 | 10586 | 29904 | 2192 | 93449 |
| 5th | 301348 | 199755 | 73276 | 52522 | 20754 | 36609 | 4049 | 101593 |
| 6th | 378252 | 270121 | 97228 | 75745 | 21483 | 45592 | 6366 | 108131 |
| 7th | 415763 | 301077 | 125606 | 94361 | 31245 | 46029 | 11322 | 114686 |
| 8th | 479383 | 354268 | 145595 | 105368 | 40228 | 61423 | 13514 | 125115 |
| 9th | 590440 | 458410 | 177464 | 133091 | 44373 | 84192 | 19767 | 132030 |
| 10th | 1007740 | 864328 | 328495 | 219055 | 109441 | 148277 | 48709 | 143412 |
| All | 415833 | 312441 | 112677 | 82212 | 30465 | 54724 | 10808 | 103392 |
| **Medians** | | | | | | | | |
| 1st | 128615 | 69674 | 0 | 0 | 0 | 5000 | 0 | 55114 |
| 2nd | 128744 | 56959 | 2086 | 0 | 0 | 4020 | 0 | 69208 |
| 3rd | 169828 | 90500 | 7782 | 0 | 0 | 5000 | 0 | 81383 |
| 4th | 185142 | 95090 | 18000 | 6000 | 0 | 6500 | 0 | 92699 |
| 5th | 247204 | 148500 | 36934 | 10847 | 3200 | 10400 | 0 | 103783 |
| 6th | 285606 | 178685 | 57438 | 32641 | 6000 | 12000 | 0 | 111740 |
| 7th | 341419 | 215422 | 73270 | 42671 | 10000 | 15100 | 0 | 117699 |
| 8th | 380870 | 236560 | 97655 | 51053 | 12000 | 23000 | 0 | 126130 |
| 9th | 471370 | 331019 | 107000 | 61011 | 21900 | 30000 | 0 | 130993 |
| 10th | 749567 | 613061 | 261503 | 17625 | 53000 | 72000 | 0 | 136390 |
| All | 284229 | 175000 | 44010 | 15913 | 3200 | 13000 | 0 | 106808 |

Note: Social Security wealth is calculated for each respondent assuming the respondent works through normal retirement. The calculation reported above is based solely on each respondent's expected benefits. No account is made of spouse survivor benefits. Sample includes families with head age 51-61, at least one member employed, and having matched Social Security records.

| Table 11. Mean Simulated and Reported HRS 401(k) Balances | | | | |
|---|---|---|---|---|
| Earnings | HRS | Simulated | | |
| Decile | Observed | Bonds | 50/50 | S&P 500 |
| **All Families** | | | | |
| 1st | 620 | 248 | 266 | 284 |
| 2nd | 1025 | 869 | 931 | 993 |
| 3rd | 2648 | 2104 | 2262 | 2418 |
| 4th | 2192 | 3475 | 3740 | 4002 |
| 5th | 4049 | 4992 | 5376 | 5753 |
| 6th | 6366 | 7855 | 8466 | 9067 |
| 7th | 11322 | 11232 | 12113 | 12980 |
| 8th | 13514 | 16291 | 17581 | 18851 |
| 9th | 19767 | 23542 | 25425 | 27280 |
| 10th | 48709 | 34555 | 37275 | 39955 |
| All | 10808 | 10516 | 11344 | 12158 |
| **Contributor Families** | | | | |
| 1st | 21693 | 2923 | 3135 | 3343 |
| 2nd | 9893 | 7775 | 8337 | 8888 |
| 3rd | 14116 | 13062 | 14044 | 15010 |
| 4th | 11747 | 18057 | 19436 | 20793 |
| 5th | 15387 | 23307 | 25098 | 26861 |
| 6th | 37219 | 29694 | 32001 | 34273 |
| 7th | 33735 | 37103 | 40012 | 42876 |
| 8th | 39505 | 46126 | 49778 | 53375 |
| 9th | 49877 | 59354 | 64101 | 68777 |
| 10th | 95199 | 85493 | 92224 | 98853 |
| All | 42271 | 42310 | 45638 | 48915 |

| Table 12. Projected Mean 401(k) Assets by Cohort, Rate of Return, and Earnings Decile, plus 1992 HRS 401(k) and Age 65 Social Security Wealth. |||||||||||
|---|---|---|---|---|---|---|---|---|---|---|
| Earnings Decile | 401(k) | SS Wealth | Cohort 25 | | | Cohort 15 | | | Universal Coverage | | |
| | | | Bond | 50/50 | S&P 500 | Bond | 50/50 | S&P 500 | Bond | 50/50 | S&P 500 |
| 1st | 620 | 61517 | 950 | 1798 | 3628 | 2395 | 4651 | 9628 | 14805 | 30771 | 68016 |
| 2nd | 1025 | 74100 | 5360 | 10023 | 20001 | 11080 | 21365 | 44037 | 39404 | 80923 | 177665 |
| 3rd | 2648 | 84055 | 11937 | 22237 | 44419 | 20901 | 40267 | 83286 | 57762 | 117340 | 255793 |
| 4th | 2192 | 93449 | 21651 | 40307 | 80848 | 34393 | 66423 | 138213 | 74497 | 149579 | 323179 |
| 5th | 4049 | 101593 | 28544 | 52493 | 104283 | 44721 | 85280 | 175645 | 91051 | 180471 | 385935 |
| 6th | 6366 | 108131 | 38669 | 71104 | 141321 | 57726 | 109535 | 224829 | 107786 | 211260 | 447924 |
| 7th | 11322 | 114686 | 59815 | 110672 | 221511 | 80512 | 153324 | 316185 | 125877 | 244385 | 513988 |
| 8th | 13514 | 125115 | 77702 | 143218 | 286004 | 99724 | 188596 | 386876 | 148264 | 284878 | 594106 |
| 9th | 19767 | 132030 | 102627 | 187939 | 373204 | 127541 | 239432 | 488196 | 179757 | 341624 | 705768 |
| 10th | 48709 | 143412 | 153852 | 276406 | 540450 | 188657 | 346466 | 693668 | 255144 | 473216 | 957672 |
| All | 10808 | 103392 | 50111 | 91620 | 181567 | 66765 | 125534 | 256056 | 109435 | 211445 | 443005 |

Note: Social Security wealth balances are calculated for each respondent assuming the respondent works through normal retirement. Both are reported in 1992 dollars. The HRS 401(k) assets are at the time of the survey in 1992. The calculation reported above is based solely on each respondent's expected benefits. No account is made of spouse survivor benefits. The sample includes families with head age 51-61, at least one member employed, and having matched Social Security records. Uses 1926-1996 average rates of return on bonds and the S&P 500.

| Earnings Decile | Age | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60-64 | All |
| **Eligibility** | | | | | | | | | |
| 1st -- Lowest | 0.245 | 0.171 | 0.156 | 0.154 | 0.179 | 0.130 | 0.119 | 0.115 | 0.166 |
| 2nd | 0.250 | 0.262 | 0.234 | 0.252 | 0.205 | 0.208 | 0.209 | 0.131 | 0.231 |
| 3rd | 0.275 | 0.293 | 0.304 | 0.339 | 0.336 | 0.317 | 0.255 | 0.192 | 0.298 |
| 4th | 0.374 | 0.330 | 0.376 | 0.430 | 0.404 | 0.391 | 0.367 | 0.204 | 0.370 |
| 5th | 0.329 | 0.403 | 0.463 | 0.454 | 0.432 | 0.417 | 0.361 | 0.277 | 0.405 |
| 6th | 0.416 | 0.445 | 0.499 | 0.516 | 0.524 | 0.471 | 0.444 | 0.363 | 0.468 |
| 7th | 0.436 | 0.568 | 0.515 | 0.590 | 0.595 | 0.524 | 0.481 | 0.398 | 0.525 |
| 8th | 0.506 | 0.583 | 0.623 | 0.610 | 0.555 | 0.572 | 0.472 | 0.369 | 0.557 |
| 9th | 0.548 | 0.644 | 0.613 | 0.659 | 0.623 | 0.625 | 0.533 | 0.439 | 0.602 |
| 10th -- Highest | 0.610 | 0.616 | 0.628 | 0.587 | 0.543 | 0.583 | 0.538 | 0.497 | 0.589 |
| All | 0.406 | 0.434 | 0.444 | 0.461 | 0.441 | 0.423 | 0.377 | 0.297 | 0.423 |
| **Participation Given Eligibility** | | | | | | | | | |
| 1st -- Lowest | 0.353 | 0.534 | 0.404 | 0.533 | 0.393 | 0.432 | 0.554 | 0.235 | 0.437 |
| 2nd | 0.417 | 0.527 | 0.526 | 0.507 | 0.428 | 0.476 | 0.463 | 0.440 | 0.483 |
| 3rd | 0.409 | 0.510 | 0.490 | 0.483 | 0.611 | 0.566 | 0.720 | 0.487 | 0.520 |
| 4th | 0.540 | 0.414 | 0.481 | 0.510 | 0.554 | 0.577 | 0.603 | 0.563 | 0.515 |
| 5th | 0.535 | 0.519 | 0.556 | 0.620 | 0.675 | 0.629 | 0.506 | 0.354 | 0.570 |
| 6th | 0.500 | 0.574 | 0.623 | 0.636 | 0.689 | 0.632 | 0.659 | 0.649 | 0.614 |
| 7th | 0.557 | 0.642 | 0.623 | 0.681 | 0.693 | 0.717 | 0.635 | 0.708 | 0.651 |
| 8th | 0.567 | 0.691 | 0.676 | 0.670 | 0.756 | 0.764 | 0.708 | 0.711 | 0.683 |
| 9th | 0.662 | 0.747 | 0.756 | 0.726 | 0.809 | 0.795 | 0.802 | 0.822 | 0.751 |
| 10th -- Highest | 0.677 | 0.782 | 0.779 | 0.795 | 0.856 | 0.803 | 0.793 | 0.820 | 0.777 |
| All | 0.556 | 0.630 | 0.630 | 0.645 | 0.693 | 0.684 | 0.671 | 0.649 | 0.638 |
| **Participation** | | | | | | | | | |
| 1st -- Lowest | 0.086 | 0.091 | 0.063 | 0.082 | 0.070 | 0.056 | 0.066 | 0.027 | 0.072 |
| 2nd | 0.104 | 0.138 | 0.123 | 0.128 | 0.088 | 0.099 | 0.097 | 0.057 | 0.111 |
| 3rd | 0.113 | 0.150 | 0.149 | 0.164 | 0.205 | 0.179 | 0.183 | 0.094 | 0.155 |
| 4th | 0.202 | 0.137 | 0.181 | 0.219 | 0.224 | 0.226 | 0.221 | 0.115 | 0.191 |
| 5th | 0.176 | 0.209 | 0.257 | 0.281 | 0.291 | 0.262 | 0.183 | 0.098 | 0.231 |
| 6th | 0.208 | 0.256 | 0.311 | 0.328 | 0.361 | 0.298 | 0.293 | 0.236 | 0.288 |
| 7th | 0.243 | 0.365 | 0.321 | 0.402 | 0.412 | 0.376 | 0.306 | 0.282 | 0.342 |
| 8th | 0.287 | 0.403 | 0.421 | 0.408 | 0.420 | 0.437 | 0.334 | 0.263 | 0.381 |
| 9th | 0.363 | 0.481 | 0.464 | 0.478 | 0.504 | 0.497 | 0.427 | 0.360 | 0.452 |
| 10th -- Highest | 0.413 | 0.482 | 0.489 | 0.466 | 0.465 | 0.468 | 0.426 | 0.408 | 0.458 |
| All | 0.226 | 0.274 | 0.280 | 0.297 | 0.305 | 0.290 | 0.253 | 0.193 | 0.270 |

**Appendix Table 1.** Eligibility, Participation Given Eligibility, and Participation Rates, by Earnings Decile and Age and Earnings Decile in 1993, Based on the SIPP

| Appendix Table 2. Eligibility, Participation Given Eligibility, and Participation Rates, by Earnings Decile and Age and Earnings Decile in 1993, Based on the CPS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Earnings Decile | Age | | | | | | | | |
| | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60-64 | All |
| **Eligibility** | | | | | | | | | |
| 1st -- Lowest | 0.20 | 0.196 | 0.123 | 0.216 | 0.209 | 0.115 | 0.097 | 0.138 | 0.169 |
| 2nd | 0.24 | 0.214 | 0.304 | 0.254 | 0.303 | 0.181 | 0.257 | 0.181 | 0.25 |
| 3rd | 0.234 | 0.442 | 0.355 | 0.461 | 0.421 | 0.339 | 0.344 | 0.220 | 0.363 |
| 4th | 0.445 | 0.502 | 0.488 | 0.552 | 0.519 | 0.484 | 0.380 | 0.259 | 0.477 |
| 5th | 0.417 | 0.481 | 0.566 | 0.559 | 0.529 | 0.501 | 0.389 | 0.409 | 0.495 |
| 6th | 0.479 | 0.480 | 0.592 | 0.522 | 0.593 | 0.623 | 0.432 | 0.474 | 0.529 |
| 7th | 0.622 | 0.669 | 0.613 | 0.662 | 0.629 | 0.581 | 0.618 | 0.553 | 0.628 |
| 8th | 0.591 | 0.634 | 0.657 | 0.768 | 0.683 | 0.727 | 0.614 | 0.606 | 0.665 |
| 9th | 0.649 | 0.759 | 0.770 | 0.718 | 0.691 | 0.670 | 0.753 | 0.614 | 0.712 |
| 10th -- Highest | 0.686 | 0.738 | 0.744 | 0.745 | 0.734 | 0.682 | 0.617 | 0.70 | 0.72 |
| All | 0.46 | 0.515 | 0.521 | 0.546 | 0.531 | 0.487 | 0.450 | 0.41 | 0.50 |
| **Participation Given Eligibility** | | | | | | | | | |
| 1st -- Lowest | 0.22 | 0.320 | 0.399 | 0.412 | 0.248 | 0.394 | 0.703 | 0.641 | 0.357 |
| 2nd | 0.21 | 0.439 | 0.418 | 0.659 | 0.548 | 0.712 | 0.777 | 0.363 | 0.498 |
| 3rd | 0.376 | 0.528 | 0.581 | 0.532 | 0.762 | 0.733 | 0.672 | 0.788 | 0.592 |
| 4th | 0.487 | 0.505 | 0.659 | 0.654 | 0.713 | 0.726 | 0.671 | 0.740 | 0.625 |
| 5th | 0.554 | 0.578 | 0.639 | 0.590 | 0.691 | 0.659 | 0.735 | 0.766 | 0.629 |
| 6th | 0.592 | 0.677 | 0.650 | 0.684 | 0.743 | 0.698 | 0.794 | 0.806 | 0.686 |
| 7th | 0.597 | 0.737 | 0.786 | 0.804 | 0.779 | 0.849 | 0.845 | 0.755 | 0.757 |
| 8th | 0.677 | 0.742 | 0.792 | 0.821 | 0.781 | 0.787 | 0.835 | 0.814 | 0.776 |
| 9th | 0.677 | 0.805 | 0.818 | 0.866 | 0.846 | 0.887 | 0.80 | 0.78 | 0.808 |
| 10th -- Highest | 0.779 | 0.828 | 0.759 | 0.925 | 0.865 | 0.847 | 0.928 | 0.83 | 0.837 |
| All | 0.588 | 0.673 | 0.700 | 0.740 | 0.744 | 0.771 | 0.799 | 0.76 | 0.71 |
| **Participation** | | | | | | | | | |
| 1st -- Lowest | 0.03 | 0.052 | 0.044 | 0.078 | 0.051 | 0.041 | 0.061 | 0.076 | 0.052 |
| 2nd | 0.039 | 0.083 | 0.120 | 0.156 | 0.136 | 0.119 | 0.170 | 0.061 | 0.109 |
| 3rd | 0.074 | 0.200 | 0.184 | 0.205 | 0.288 | 0.204 | 0.205 | 0.159 | 0.186 |
| 4th | 0.188 | 0.228 | 0.292 | 0.323 | 0.370 | 0.326 | 0.231 | 0.180 | 0.272 |
| 5th | 0.211 | 0.240 | 0.355 | 0.305 | 0.358 | 0.312 | 0.295 | 0.245 | 0.290 |
| 6th | 0.247 | 0.306 | 0.366 | 0.342 | 0.417 | 0.382 | 0.312 | 0.354 | 0.335 |
| 7th | 0.362 | 0.474 | 0.433 | 0.480 | 0.480 | 0.475 | 0.466 | 0.378 | 0.446 |
| 8th | 0.369 | 0.431 | 0.503 | 0.603 | 0.496 | 0.538 | 0.516 | 0.422 | 0.484 |
| 9th | 0.412 | 0.600 | 0.598 | 0.580 | 0.556 | 0.581 | 0.568 | 0.443 | 0.548 |
| 10th -- Highest | 0.504 | 0.594 | 0.546 | 0.668 | 0.628 | 0.548 | 0.564 | 0.569 | 0.58 |
| All | 0.241 | 0.318 | 0.344 | 0.373 | 0.375 | 0.350 | 0.336 | 0.286 | 0.33 |

| Earnings Decile | Age | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60-64 | All |
| **Appendix Table 3. Employee Contribution and Employer Matching Rates, by Earnings Decile and Age, for 1993, Based on the CPS** | | | | | | | | | |
| **Employee Contribution Rate** | | | | | | | | | |
| 1st -- Lowest | 0.065 | 0.057 | 0.043 | 0.075 | 0.072 | 0.061 | 0.067 | 0.075 | 0.064 |
| 2nd | 0.064 | 0.086 | 0.054 | 0.052 | 0.063 | 0.060 | 0.056 | 0.106 | 0.062 |
| 3rd | 0.060 | 0.054 | 0.055 | 0.051 | 0.064 | 0.062 | 0.062 | 0.070 | 0.058 |
| 4th | 0.049 | 0.060 | 0.051 | 0.069 | 0.059 | 0.072 | 0.061 | 0.071 | 0.061 |
| 5th | 0.061 | 0.058 | 0.059 | 0.056 | 0.070 | 0.070 | 0.076 | 0.063 | 0.063 |
| 6th | 0.061 | 0.056 | 0.056 | 0.055 | 0.059 | 0.065 | 0.085 | 0.074 | 0.061 |
| 7th | 0.049 | 0.053 | 0.051 | 0.054 | 0.053 | 0.066 | 0.076 | 0.075 | 0.057 |
| 8th | 0.056 | 0.056 | 0.054 | 0.061 | 0.066 | 0.066 | 0.059 | 0.090 | 0.061 |
| 9th | 0.054 | 0.048 | 0.054 | 0.057 | 0.064 | 0.055 | 0.074 | 0.066 | 0.057 |
| 10th -- Highest | 0.059 | 0.058 | 0.056 | 0.062 | 0.067 | 0.062 | 0.068 | 0.073 | 0.062 |
| All | 0.056 | 0.056 | 0.054 | 0.059 | 0.063 | 0.064 | 0.069 | 0.074 | 0.060 |
| **Employer Matching Rate** | | | | | | | | | |
| 1st -- Lowest | 0.054 | 0.028 | 0.018 | 0.029 | 0.035 | 0.025 | 0.021 | 0.046 | 0.031 |
| 2nd | 0.120 | 0.037 | 0.021 | 0.023 | 0.025 | 0.024 | 0.022 | 0.005 | 0.029 |
| 3rd | 0.032 | 0.031 | 0.023 | 0.026 | 0.033 | 0.031 | 0.044 | 0.041 | 0.031 |
| 4th | 0.026 | 0.032 | 0.028 | 0.025 | 0.030 | 0.039 | 0.027 | 0.026 | 0.029 |
| 5th | 0.029 | 0.033 | 0.023 | 0.019 | 0.019 | 0.028 | 0.028 | 0.021 | 0.025 |
| 6th | 0.032 | 0.030 | 0.022 | 0.020 | 0.019 | 0.024 | 0.041 | 0.029 | 0.026 |
| 7th | 0.026 | 0.029 | 0.025 | 0.022 | 0.023 | 0.021 | 0.028 | 0.034 | 0.025 |
| 8th | 0.031 | 0.029 | 0.024 | 0.022 | 0.027 | 0.028 | 0.021 | 0.033 | 0.026 |
| 9th | 0.024 | 0.024 | 0.020 | 0.026 | 0.027 | 0.015 | 0.034 | 0.020 | 0.024 |
| 10th -- Highest | 0.026 | 0.022 | 0.037 | 0.030 | 0.033 | 0.027 | 0.030 | 0.044 | 0.030 |
| All | 0.029 | 0.028 | 0.025 | 0.024 | 0.027 | 0.025 | 0.030 | 0.031 | 0.027 |
| **Total Contribution Rate** | | | | | | | | | |
| 1st -- Lowest | 0.120 | 0.085 | 0.061 | 0.104 | 0.107 | 0.086 | 0.089 | 0.120 | 0.095 |
| 2nd | 0.184 | 0.124 | 0.075 | 0.075 | 0.088 | 0.083 | 0.078 | 0.111 | 0.092 |
| 3rd | 0.092 | 0.086 | 0.079 | 0.077 | 0.098 | 0.093 | 0.106 | 0.111 | 0.089 |
| 4th | 0.075 | 0.092 | 0.079 | 0.095 | 0.089 | 0.111 | 0.088 | 0.097 | 0.090 |
| 5th | 0.091 | 0.092 | 0.082 | 0.075 | 0.090 | 0.097 | 0.104 | 0.084 | 0.088 |
| 6th | 0.093 | 0.086 | 0.078 | 0.075 | 0.078 | 0.089 | 0.126 | 0.104 | 0.087 |
| 7th | 0.075 | 0.082 | 0.076 | 0.076 | 0.076 | 0.087 | 0.104 | 0.108 | 0.082 |
| 8th | 0.087 | 0.085 | 0.078 | 0.082 | 0.093 | 0.094 | 0.080 | 0.123 | 0.087 |
| 9th | 0.078 | 0.072 | 0.074 | 0.082 | 0.090 | 0.070 | 0.108 | 0.086 | 0.080 |
| 10th -- Highest | 0.085 | 0.080 | 0.093 | 0.093 | 0.100 | 0.089 | 0.099 | 0.117 | 0.092 |
| All | 0.086 | 0.084 | 0.080 | 0.083 | 0.090 | 0.089 | 0.099 | 0.106 | 0.087 |